

HOWLAND CLIMATE
(DRAFT)

Very few weather observations have been made on Howland
Weather observations for Howland are limited but show a fairly
but the few existing records indicate
uniform climate with little seasonal change. The average annual tempera-
for — years (Ref) (Ref) — varies
ture and seasonal range has a negligible variation of less than five
from — to —. The seasonal range of temperature is also slight
degrees. The sea water temperature as recorded by the USS Point Barrow
in October, 1963, showed an average of 86 to 87 degrees F. which may
be a factor in temperature stabilization. During that period the normal
daily air temperature readings were in the 80's with a high of 90°
and a low of 81° F. Recorded daily temperature variations on Howland
have not exceeded ~~xxx~~ the 17 degree variation ~~recorded~~ observed by
Ramsey in September, 1924. ^{1/} Slight seasonal variations are evident
however with the hottest temperature occurring in September and the
coldest during March. Recorded temperature extremes are 71° and 101°
F. (AEC, 1963)

Howland is located in the south equatorial current zone where the
currents are from east to west. Cloud cover is normally strato-cumulus
with maximum cloud cover occurring from November to May.

Information on precipitation is scant and inconclusive. More data
on this would be of particular value to the biologist for on Howland and
other similar atolls just south of the equator one of the most important
factors influencing the flora and fauna of the island is the extreme

1/ The Uss Point Barrow and Ramsey were both in the Howland area during
the month of October; the former in 1963 and the latter in 1924

fluctuation in rainfall from year to year. Sometimes more than a year may elapse with no rain at all. In other times more than the annual average may fall in one month. Under such conditions the general aspect is much drier than the average annual rainfall would suggest. And the luxuriance may vary so much that descriptions written several years apart scarcely sound as though the same island were described. On islands with large populations of seabirds the injurious effects of ~~XXXX~~ high concentrations of guano seem to be greatly accentuated by these severe dry periods. Trees may be severely damaged or killed, as was the case with the Kou trees on Howland (Fosberg, 1953).

In commenting on this variability of rainfall in the South Pacific Seelye (1950) wrote that the annual rainfall is most variable along the western tongue of the equatorial dry zone, or Howland area, where the north-south rainfall gradient is steep. Thus comparatively small disturbances of the controlling atmospheric circulation from normal would be expected to produce spectacular changes there. Spectacular changes are indeed what we get from the few reports that are available on Howland's yearly rainfall. Ramsay (1924) of the Whippoorwill Expedition doubts that Howland has a mean annual precipitation of over 3 inches while Doran (1959) states that Howland's annual precipitation may be estimated at 25 inches. Knoch (1927) apparently had the right idea when he reported that the annual precipitation may vary as much as 24 inches from year to year. Much more data would be necessary before any definite average could be given, for with such anomalies it is understandable that even the ten year averages would differ greatly from each other. In particular the 1910-1919 average is pushed up by the two extraordinarily rainy

years 1914 and 1915. (Knoch, 1927)

The attempts at explanation concern themselves chiefly with the *Howland's* low annual amount overall, which does not seem to fit ~~the~~ into the tropical rain belt at all. Woeikoff (1880) says on this point that the ~~XXXXXXXXXX~~ Howland area is the region where one assumes that the dividing line between the two trade winds is narrowest, but according to actual observations by Hague in 1862, the two trade winds must have no dividing line here and merge completely ~~XXXX~~ into each other. ~~They~~ *Howland* would thus belong year round to the low precipitation zone, particularly lacking mountains or other local conditions that might cause rain. In fact, the very flatness is credited by some with the actual ability to discourage rain. According to Hague's 1862 observations "a shower of rain approaching the island divided into two parts and passed by to the north and south, the cloud being split by the heated column of air that rises from the white coral sand." Ellis(1937), Bryan(1942), and Ramsay(1924) also mention this phenomenon. This would tend to explain the fact stated by Bryan and Hague that it usually rains at night on Howland if at all. POBSP observations have also noted this fact.

W. Koppen ^{*(1923)*} approaches the matter of rainfall variation in this region from the oceanographic facts. He says, "As an explanation we can deduce here only the strip of cold water which (probably sucked up from the depths by the strong westerly stream in the southeast trades) runs from the Galapagos along the equator almost, (but not quite) to these

islands. The great variability in amounts of rainfall may be conditioned by the shifting of cold-water and warm-water surfaces." Knoch(1927) and Wiens(1962) state that while the strikingly low annual average precipitation is surely connected with the temperature of the sea water, they do not consider that explanation satisfactory for the variations in precipitation, and relate this to wind direction and constancy instead.

Howland is dominated by the south east trade winds with easterly winds prevailing most of the year. During the "winter" ~~or ~~XXXXXX~~~~ period (from October to March) the winds are northeasterly and during the "summer" period (from April to September) the winds tend to be more southeasterly. While the northeasterly winds have been ~~XXX~~ credited with the wet season ~~XXXXXX~~ on Howland (Brooks, 1926), latter data ^{indicates} proves that the rains are more likely to be caused by the occurrence of W and NW winds. The confusion here could have resulted from the fact that the infrequent westerlies do seem to occur for the most part in the winter or northeasterly season, for in all recorded instances of shipwrecks on Howland (caused by weather) obtainable, squalls with ^W westerly winds were cited. And it would seem from this data that westerlies are most likely to occur during the winter or northeasterly season since 7 of the 9 shipwrecks occurred during that period. Shipwrecks caused by westerlies on nearby Baker Island also occurred mainly during ^{the} ~~that~~ season.

Proof in the opposite direction for Howland's rainfall resulting from westerlies is furnished by the low precipitation years 1910, 1916, and 1917. During those years no disturbances of the trades by westerlies ^{were} ~~was~~ recorded. (Knoch, 1927)

Unfortunately only few, scattered remarks other than shipwreck information can be found in the literature that point to these abnormal wind directions and thus no regular ~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~ ~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~ pattern is known for sure. In view ~~of~~ of the apparent great rarity of their occurrence it was a fortunate thing that at least one meteorologically interested observer has witnessed them over a period of many years. *Knech states that* In ~~the~~ sailing manual for the Pacific Ocean, ~~XXX~~ 1897 edition, *man* there is the statement of a factor ~~XX~~ *of ?* who had lived for thirty years on the guaho islands to the effect that *noted* on Maulden, ~~Howland and Baker Islands~~ once every ten years, regularly, stormy weather with ~~XXXXXXXXXXXX~~ westerly winds is to be expected, which he said, occurred particularly during the months November through March. This was true for example, he said, in 1867-1868 for Baker and Howland. *note*

~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~ Although the foregoing discussion has not been able to reach any confirmed result, it should nevertheless show that any information, even that supported only by memory as in the above case, is of value. Due to the overall scarcity of meteorological information concerning Howland, and that certain data which could be gathered by the POBSP, such as wind direction, is of particular value.

It will be promising to devote greater attention to weather phenomena in the ~~Howland~~ area for usually greater changes take place in the equatorial regions from year to year than we are in the habit of expecting (Knoch, 1927) and according to our concepts of the coherence of the system of the Earth's atmosphere they must affect changes in other parts of the Earth as well.

Handwritten notes on the right margin, including a vertical line and some illegible text.

Handwritten note on the left margin, possibly 'Howland'.

Handwritten note on the left margin, possibly 'Howland'.

June 21

Tina's

June 21

HOWLAND - CLIMATE

Only a limited number of weather observations have been made on Howland, however the few existing records do indicate a fairly uniform climate with little seasonal change except ^{for} variation in amount of rainfall. Records of observations made during the 1935 to 1942 colonization and the 1943 to 1945 ~~military~~ occupation show Howland as having a mean annual temperature of 83° F with monthly means not more than 1° above or below. Slight seasonal variations in temperature do occur with the warmest temperatures in September (extreme mean maxima of 89° recorded then) and the coolest in March (when the extreme mean maxima of 86° was recorded; mean minima are always near 79° F). Extremes recorded are 101° and 71° F. (Pacific Missile Range publication, 1959)

Humidity readings are low generally but show a slight rise at night. (from 55 to 86, Ramsay, 1925)

The sea water temperature ranged between 86 and 87 degrees F during a four day period in October, 1963. (AEC, 1963)

Howland is located in the south equatorial current zone where the currents are from east to west. Cloud cover is most frequently strato-cumulus with maximum clouds occurring from November to May. (AEC, 1963)

Information on precipitation is scant and inconclusive but available records do show the annual rainfall to be extremely variable (Knoch, 1927). Sometimes more than a year may elapse with little or no ~~rain~~ rain at all as in 1859-1860 (Hague, 1862). At other times more than the annual

average may fall in one month. Because of this variability the general aspect of the island is much drier than the average annual rainfall would suggest. The growth of the vegetation may vary so much that descriptions written several years apart may scarcely appear to refer to the same island.

In commenting on rainfall in the south Pacific, Seelye (1950) wrote that annual rainfall is most variable along the western tongue of the equatorial dry zone which has a steep north-south rainfall gradient. Thus comparatively small disturbances of the controlling atmospheric circulation would be expected to produce spectacular changes in that area. Pacific Project observations on Howland, which is in this area, indicate that this conjecture is correct. When rain does fall, it usually falls in torrential showers, and several inches may fall in a few hours. July and October, 1963, were very wet but there seems to have been little rainfall since that time, judging from the state of the vegetation.

Ramsay (1925) of the Whippoorwill Expedition doubts that Howland has a mean annual precipitation of over three inches, while a Pacific Missile Range publication states that Howland's annual precipitation may be estimated at twenty-five inches. Knoch (1927) apparently was more accurate when he simply stated that the annual precipitation may vary as much as twenty-four inches from year to year.

Attempts at explanation of this variability of rainfall concern themselves chiefly with Howland's low annual amount overall, which does not seem to fit into the tropical rain belt at all. Woeikoff in Knoch (1927) says on this point that the Howland area is the region where one assumes that the dividing line between the two trade winds is narrowest, but according

to actual observations by Hague in 1860, the two trade winds must have no dividing line here and merge completely into each other. Howland would thus belong year round to the low precipitation zone, particularly lacking mountains or other local conditions that might cause rain. In fact, the very flatness is credited by some with the actual ability to discourage rain. According to Hague's 1860 observations, "A shower of rain approaching the island divided into two parts and passed by to the north and south, the cloud being split by the heated column of air that rises from the white coral sand." Ellis(1937), Bryan(1942), and Ramsay(1924) also mention this phenomenon. This would tend to explain the fact stated by Bryan and Hague that it usually rains at night on Howland if at all. Pacific Project observations have also noted this fact.

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Howland is dominated by the Southeast trade winds with Easterly winds prevailing most of the year. During the "winter"

period (from October to March) the winds are Northeasterly and during the "summer" period (from April to September) the winds tend to be more Southeasterly. While the Northeasterly winds have been credited with the wet season on Howland (Brooks, 1926)

~~THESE~~ ^{other} later data indicates that the rains are more likely to be caused by the occurrence of Westerly and Northwesterly winds.

The confusion here could have resulted from the fact that the infrequent Westerlies ~~do seem to occur for the most part in the~~ ^{often}

^{in the} winter ~~or Northeasterly season,~~ ~~for~~ ^{available known} ~~in~~ all recorded instances

of shipwrecks on Howland ~~AVAILABLE~~ ~~which were~~ caused by weather, squalls with Westerly or Northwesterly winds were cited. And it

would seem from this data that Westerlies are most likely to occur during the winter months since 7 of the 9 shipwrecks occurred during that period. Shipwrecks caused by Westerlies on nearby Baker Island also occurred mainly during the winter.

Proof in the opposite direction for Howland's rainfall resulting from Westerlies is furnished by the low precipitation years 1910, 1916, and 1917. During those years no disturbances of the trades by Westerlies were recorded. (Knoch, 1927)

Unfortunately only few, scattered remarks other than shipwreck information can be found in the literature that point to these abnormal wind directions and thus no regular pattern is known for sure. In view of ~~THESE~~ the apparent great rarity of their occurrence it was a fortunate thing that at least one meteorologically interested observer has witnessed them over a period of many years. Knoch states that a man who had lived for thirty years on the guano

islands of Malden, Howland, and Baker noted regularly stormy weather with Westerly winds once every ten years, which, he said, occurred particularly during the winter months. This was true for example, he said, in 1867 and 1868 for the Howland and Baker area.

Due to the overall scarcity of meteorological information concerning Howland, any information, even that supported only by memory, as in the above case, is of value. Therefore certain data such as wind direction which could be gathered by the Pacific Project would be of particular value in an overall ~~picture~~ weather picture of the Howland area. It should be especially promising to devote greater attention to weather phenomena in this area for usually greater changes take place in the equatorial regions from year to year than we are in the habit of expecting (Knoch, 1927) and according to our concepts on the coherence of the system of the Earth's atmosphere they must affect changes in other parts of the Earth as well.

W. H. H. H.
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SHIPWRECKS *** HOWLAND

LIZZIE OAKFORD	25 Sept. 1867	during a shift of wind from the eastward to the Westward
MONSOON	10 Jan.	wind hauled from southease to southWest
ARNO	October Aug. 9th	squall from the westward wrong navigation
EMERALD ISLE	Oct. 3	squall from westward
MATAPAN	Oct. 3	squall from westward
Mary Robinson	June 28th	heavy squall
HARRISON	June 28th 1864	heavy squall
WHITE SWALLOW	Oct. 5th	violent squall
KATHAY	Jan. 20th 1867	squall

? Read, Administrative data p. 10-11

10/11/45, Dec. 17, 1945

Records of Quilting at 10/11/45

10/11/45 - 10/11/45 to 10/11/45

11 5-6710 Army Dept.

Moral Dept
Capt. Ch. (A83170)
~~Frank~~

~~4/2/45~~ Adm. of St. Nestit

11 82730

10/11/45 - 10/11/45

Geography of the Pacific

Climate Outline

- 1. General
- 2. Temperature
- 3. Ocean Currents as affecting weather
- 4. Winds, Storms
- 5. Cloud Cover
- 6. Precipitation
- 7. General comments by POOP

I 83.5

Bill Hodges

National Weather Rec. Center
Asheville, N. Carolina

4000000
 Dial 8
 707
 254-0961

Karpovich, Dec. 1937 Taney
 Apr 18 - 1940

Black, R.B. - Virginia

Mr. Cantwong 24th & M - Man Weather Bureau Office
 191-461

will know Black's address —

Very few weather observations have been made on Howland but the few existing records indicate a fairly uniform climate with little seasonal change. () ()
air

The average annual temperature for _____ years varies less than five degrees. The year to year range in the annual temperature is also slight. The minimum annual temperature range was from 71 degrees in _____ to 76 degrees in _____, while the maximum annual temperature range was from 94 degrees in 1924 to 101 degrees in _____. The maximum temperature which has been recorded on Howland was _____ in _____ and the minimum was 71 ; in _____.

Slight seasonal variations in temperature do occur however, with the warmest temperatures in Sept. (mean for _____ years _____) and the coolest in March (mean for _____ years _____)

The sea water temperature ranged between 86 and 87 degrees Fahrenheit during a four day period in October 1963. (Aug, 1963)

~~((If other records for sea water temperature occur put them here in a small paragraph comparing those results with those of the Point Barrow) ((If in the above paragraphs if you can not find data for blank spaces then put in what data you have and state in what manner it is limited, time, duration, etc.))~~

Howland is located in the south equatorial current zone where the current are from east to west. Cloud cover is frequently strato-cumulus with maximum cloud occurring from November to May. ~~((expand cloud cover somewhat))~~

Information on precipitation is scant and inconclusive, but the annual rainfall is extremely variable ()
Sometimes more than a year may elapse with no rain at all as in 1859 (Nov 1859)

)-0002-55
35-42

At other times more than the annual average may fall in one month. Because of this variability the general aspect of the island is much drier than the average annual rainfall would suggest. The growth of the vegetation may vary so much that descriptions written several years apart may scarcely appear to refer to the same island.

In commenting on ~~this variability of~~ rainfall in the South Pacific, Seelye (1950) wrote that ~~the~~ annual rainfall is most variable along the western tongue of the equatorial dry zone ~~(in which Howland is located) where the north-south axis~~ which has a steep north-south rainfall gradient. Thus comparatively small disturbances of the controlling atmospheric circulation would be expected to produce spectacular changes in that area. Pacific Project observations on Howland ~~our few records from Howland~~, which is in this area, indicate that this conjecture is correct. When rain does fall, it usually falls in torrential showers, and several inches may fall in a few hours. July and October, 1963 were very wet ~~and there has~~ ~~been almost no rain in the year since~~, but there seems to have been but little rainfall since that time, judging from the state of the vegetation.

Ramsay (1925) of the Whippoorwill Expedition doubts that Howland has a mean annual precipitation of over three inches while a Pacific Missile Range publication states that Howland's annual precipitation may be estimated at 25 inches. Knoch apparently was more accurate when he simply stated that the annual precipitation may vary as much as 24 inches from year to year.

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DRAFT, HOWLAND CLIMATE

Weather observations for Howland are limited but show a fairly uniform climate with little seasonal ~~variation~~ change. The average annual temperature and seasonal range has a negligible variation of less than five degrees.

The ^{sea}water temperature as recorded by the NM USS Point Barrow in October, 1963, showed an average of 86-87 degrees F. which may be a factor in temperature stabilization (~~AEC, 1963~~). During that period the normal daily air temperature readings were in the 80"s with a high of 90 degrees and a low of 81 degrees F. ~~Recorded temperature extremes are 71° and 101° F. (AEC, 1963)~~ Slight seasonal variations are evident however with the hottest temperature occurring in September and the coldest during March. Recorded temperature extremes are 71° and 101° F. (AEC, 1963)

Recorded ^{temp} Daily variations ^{on H.} have not exceeded 17° (Ramsay) *

* As H. Ramsay & Ramsay both lived in Oct 1963 and not 1963

PRECIPITATION introduc tion

Information on Precipitation ~~in the Howland area~~
is scant and inconclusive. More data on this
~~subject~~ would be of particular value to
the biologist for

On Howland and other similar atolls just south of the equator one of the most potent factors in influencing the flora and fauna of the island is the extreme fluctuation in rainfall from year to year . Sometimes more than a year may elapse with no rain ~~at~~ at all. In other times more than the ~~average~~ annual average may fall in one month. Under such conditions the general aspect is much drier than than the average annual rainfall would suggest. And the luxuriance may vary so much that discriptions written several years apart scarcely sound as though the same island were described. On islands with large populations of sea birds the injurious effects of high ~~con~~ centrations of guano seem to be greatly accentuated by these severe dry periods. Trees may be severely damaged or killed, as was the case witht the Kou trees. on Howland. (Fosberg, 1953)

In commenting on the variability of rainfall in the south Pacific. Seelye (1950, p.12) wrote that the annual rainfall is most variable along the western tongue of the equatorial dry zone ^{or Howland area} where the north-south rainfall gradient is steep. Thus comparatively small disturbances of the controlling atmospheric circulation from normal would be expected to produce spectacular changes there.

And spectacular changes are indeed what we get from the few reports that are available on Howland's ~~annual~~ yearly rainfall. Ramsay (1925) of the Whippoorwill Exp. doubts that Howland has a mean annual precipitation of over 3 inches while Doran (1959) states that Howland's annual precipitation may be estimated at 25 inches. Knock (1927) apparently had the right idea when he reported that the annual precipitation may vary as much as 24 inches from year to year. Much more data would be necessary before any definite average could be given for →

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PRECIPITATION

~~on Howland~~

~~Hann () in his equatorial studies gave data that afforded a very good picture of the striking variations in precipitation that take place near the equator.~~

~~The range of variation in annual amounts has greatly increased since. Knoch (1927) reports annual variation of 24 inches.~~

With such anomalies it is understandable that even the ten-year averages would differ greatly from each other. In particular the 1910-1919 average is pushed up by the two extraordinarily rainy years 1914 and 1915.

~~The attempts at explanation concern themselves chiefly with the low annual amount overall, which does not seem to fit into the tropical rain belt at all. Woeikoff () says on this point that the region where Howland is situated is the region where one assumes that the dividing line between the two trade winds is narrowest, but according to actual observations by Hague⁽¹⁸⁶²⁾ the two trade winds must have no dividing line here and merge completely into each other. They would thus belong year round to the low precipitation zone, particularly lacking mountains or other local conditions that might cause rain. In fact, the very flatness is credited by some with the actual ability to discourage rain. According to Hague's observations, " a shower of rain approaching the island divided into two parts and passed by to the north and to the south, the cloud being split by the heated column of air that rises from the white coral sand. " ¹⁸⁶² Eltis 1937¹⁰⁰⁰ also~~

mentions this phenomenon. ~~this~~ this would tend to ~~back up~~ ^{substantiate} the theories of

~~several colonists~~ ^{→ Bryan 1942 + Hague 1862} who stated that it usually rained at night on Howland, if at all. ^{Ramsay 1924} Recent POP observations have also confirmed this.

~~POP observations have also confirmed this.~~
~~POP obs~~

Ramsay (1925) doubts that Howland has a mean annual ~~time~~ precipitation of over 77 mm.

Brooks, 1926) states that there is a relationship between the rainfall on an island such as Howland and the direction and steadiness of the wind. Studies in the equatorial Pacific show that on several of these islands (Malden, Ocean) there was the same extraordinary dryness with winds from the east or southeast compared with those of other directions. The apparent dryness of the winds from the east or south east is due to their greater ~~consistancy~~ constancy. for the greatest source of rain is to be found in winds of conflicting directions.

of rainfall variation

W. Koppen () approaches the matter from the oceanographic facts. He says, "As an explanation we can deduce here only the strip of cold water which (probably sucked up from the depths by the strong westerly stream in the southeast trades) runs from the Galapagos along the equator almost (but not quite) to these islands. The great variability in amounts of rainfall may be conditioned by the shifting of ~~winds~~ cold-water and warm-water surfaces" ~~similar to those~~

(*and Niens (1902)*) Knoch states that while the strikingly low annual average ^{precip.} is surely to be connected with the temperature of the sea water, ~~they~~ does not consider that explanation satisfactory for the ~~mean~~ variations in precipitation, and ~~prefers instead~~ relate this to wind direction and constancy instead.

CURRENTS

Howland is located in the south equatorial current zone where the currents are from east to west, and Cloud cover is normally strato-cumulus ^{with} ~~and~~ maximum cloud cover occurring ~~be~~ from November to May.

WINDS

Howland is dominated by the South East Trade Winds with easterly winds prevailing most of the year. During the "winter" or October to March period the winds are northeasterly and from April to September, or during the "summer", the winds tend to be more southeasterly. While the northeasterly winds have been credited with the cause of the wet season on Howland, latter data proves that the rains are more likely to be caused by the infrequent occurrence of W and NW winds. In all recorded instances of shipwrecks (caused by weather) obtainable (WPA) squalls from the with westerly winds were cited. And it would also seem from the shipwreck data that westerlies are most likely to occur in the Howland area during the winter, since 7 of the 9 shipwrecks occurred during the period from the last part of Sep. through January, and the shipwrecks caused by westerlies on nearby Baker I also occurred during this period.

The proof in the opposite direction is furnished by the low precipitation years 1910, 1916, and 1917. During those years no disturbances of the trades by westerlies was recorded.

Unfortunately only few, scattered remarks other than ship info can be found in the literature that point to these abnormal wind directions and thus no regular pattern is known. In view of the great rarity of their occurrence it was a fortunate stroke of chance that at least one meteorologically interested observer has witnessed them over a period of many years. In the sailing manual for the Pacific ocean, 1897 edition, there is the statement of a factor who had lived for th

Brooks
"Edgely D's"
The shipwrecks were extraordinary because with winds from southeast compared with those from other directions.

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winds

thirty years on the guano islands to the effect that on Maulden, Howland, and Baker Islands once every ten years, regularly, stormy weather with westerly winds is to be expected, which he said occurred particularly during the months Nov. through March. This was true for example, he said in 1867-68 for Baker and Howland .

Although

Although the foregoing discussion has not been able to reach any confirmed result, it should nevertheless show that any information, even that supported only by memory (as in the above case) is of value due to overall

the scarcity of meteorological information concerning Howland, and that *certain*

which could be data gathered by the Project, *such as* wind direction, ~~in particular, is of great~~

~~is~~ *is of particular value.*

It will be ~~very~~ promising to devote greater attention to ^{weather} phenomena
 in the ^{Howland area} ~~equatorial regions~~ for usually greater changes take place ^{in the equatorial regions} ~~there~~ from y
 year to year than we are ^(Knoch, 1927) ~~generally~~ in the habit of expecting, and according-
 to our concepts of the coherence of the system of movement of the earth's
 atmosphere they must affect changes in other parts of the earth as well.

~~(Knoch, 1927)~~

UNITED STATES DEPARTMENT OF COMMERCE
WEATHER BUREAU

July 9, 1965

IN REPLY REFER TO

FILE: C-5.2132 (Job 1471)

IN REPLY ADDRESS

NATIONAL WEATHER RECORDS CENTER
FEDERAL BUILDING
ASHEVILLE, NORTH CAROLINA 28801

Reference: Your telephone call
6/18/65 and our letter
C-5.21, 6/23/65

Miss Tina Abbott
Pacific Project-Department of Birds
Smithsonian Institution
Washington, D. C.

Dear Miss Abbott:

We are forwarding, by separate mail, 2 reels of 35mm microfilm copy of the Code Sheets - 1130 Aer. for Howland Island for the period beginning April 1935 through November 1941. Enclosed is a reference manual which contains the key to the de-coding of the data as entered on the microfilmed code sheets.

Stations other than requested also appear on these reels.

Sincerely yours,

William T. Fudge
for William H. Haggard
Acting Director

Enclosure
Separate cover

Division of Birds
August 24, 1965

William H. Haggard
Acting Director
National Weather Records Center
Federal Building
Asheville, North Carolina

Dear Mr. Haggard:

Thank you for the weather data on microfilm of Howland Island which we have just recieved from you.

We are now working on reports of the following islands and need what ever weather data you may have on them. As it takes us some time to get the data in usable form and our reports are being rushed, we would appreciate having this as soon as possible.

The following are the Pacific islands for which we need weather data:

Phoenix Islands

McKean
Canton
Enderbury
Birnie
Phoenix
Sydney
Hull
Gardner

Line Islands

Jarvis
Palmyra
Washington
Fanning
Christmas
Malden
Starbuck

Baker Island

Hawaiian Islands

Midway
Kure
Pearl and Hermes

Sincerely yours,

Tina C. Abbott
Research Illustrator

~~247.10~~
82.36
960
432
1392

145
11971
82.55

093
7626
82.00

214
17471

March 1937
Sept.

X100

CODE SHEET FOR FORM 1130-AER.

STATION

MAR 1937

MONTHS

SEP 1937

STATION NUMBER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER																						WET BULB			
																																					1 ST. HALF	2 ND HALF		
1100	03	16	37	01																																				
				02																																				
				03																																				73
				04																																				
				05																																				
				06																																			75	
				07																																				
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				19																																				
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				22																																				
				23																																				
				24																																				

ENTERED BY _____

CHECKED BY _____

PUNCHED BY 1157

x100

CODE SHEET FOR FORM 1130-AER.

SEP 1937

MONTHS

SEP 1937

STATION

STATION NUMBER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	WET BULB					
																															1ST HALF	2ND HALF				
1100	03	13	37	01												09	13	37	01																	
				02																																
				03		699	05	-		78	72	04	14	1984							80	73	05	11	1984											
				04																																
				05																																
				06						79	71	04	13	1984																						
				07																																
				08																																
				09		208		78		82	72	14	15	1988																						
				10																																
				11																																
				12		699	10	78		85	72	04	14	1989																						
				13																																
				14																																
				15		699		78		86	72	04	15	1986																						
				16																																
				17																																
				18		208		78		83	76	04	11	1982																						
				19																																
				20																																
				21		699	10	78		80	73	04	14	1983																						
				22																																
				23																																
				24						80	73	04	13	1982																						

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CODE SHEET FOR FORM 1130-AER.

STATION X100

MAR 1937

MONTHS

SEP 1937

STATION NUMBER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER		MONTH	DAY	YEAR	HOUR	GROUP INDICATION CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	WET BULB								
																														1ST. HALF	2ND. HALF							
1100	03	10	37	01					78	72	04	14	1	979		09	10	37	01																			
				02																																		
				03					78	72	04	14	1	979																								
				04																																		
				05																																		
				06					79	73	04	15	1	976																								
				07																																		
				08																																		
				09	6	99	-	78	81	72	04	16	2	978																								
				10																																		
				11																																		
				12	6	99	-	78	86	73	04	14	1	978																								
				13																																		
				14																																		
				15	1	06	-	78	86	74	04	17	2	968																								
				16																																		
				17																																		
				18	1	99	-	78	85	74	04	14	1	969																								
				19																																		
				20																																		
				21	6	99	10	78	79	75	04	13	1	974																								
				22																																		
				23																																		
				24	-	-	-	-	78	74	04	14	1	975																								

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CODE SHEET FOR FORM 1130-AER.

STATION **X100**

MAR 1937

MONTHS

SEP 1937

STATION NUMBER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	WET BULB						
																															1ST. HALF	2ND. HALF					
1100	03	08	37	01												09	08	37	01																		
				02																																	
				03						79	73	04	20	2	978																			75	74		
				04																																	
				05																																	
				06						78	73	04	24	2	974																						
				07																																	
				08																																	
				09					78	80	74	04	20	2	977																				75	75	
				10																																	
				11																																	
				12					78	85	77	04	19	2	975																				78	77	
				13																																	
				14																																	
				15					78	86	77	04	19	2	968																					79	76
				16																																	
				17																																	
				18					78	83	74	04	18	2	966																					77	76
				19																																	
				20																																	
				21					78	80	74	04	19	2	969																					75	73
				22																																	
				23																																	
				24					78	79	74	04	17	2	970																					75	79

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X100

CODE SHEET FOR FORM 1130-AER.

STATION

MAR 1937

MONTHS

SEP 1937

STATION NUMBER	MONTH	DAY	YEAR	HOUR	GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	MONTH				DAY				YEAR				GROUP INDICATION	CEILING HEIGHT	SKY CONDITION	VISIBILITY	WEATHER & OBSTRUCTIONS TO VISION	TEMPERATURE	DEW POINT	WIND DIRECTION	WIND VELOCITY	VEL. GROUP IND.	BAROMETER	WET BULB 1 ST. HALF	WET BULB 2 ND HALF												
					50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																	
X100	03	05	37	01													09	05	37	01																																
				02						78	72								02																													74				
				03																03	Missing																															
				04																04																																
				05																05																																
				06						79	73	04	17	2	978					06																																
				07																07																																
				08																08																																
				09		6	99	10	78		81	74	04	16	2	981				09	104																															
				10																10																																
				11																11																																
				12		6	99				86	76	01	18	2	981				12	207																															
				13																13																																
				14																14																																
				15		6	99				87	76	04	15	1	974				15	208																															
				16																16																																
				17																17																																
				18		6	99				85	75	04	13	1	972				18	208																															
				19																19																																
				20																20																																
				21							80	76	04	15	1	978				21																																
				22																22																																
				23																23																																
				24							79	73	04	16	2	978				24																																

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