

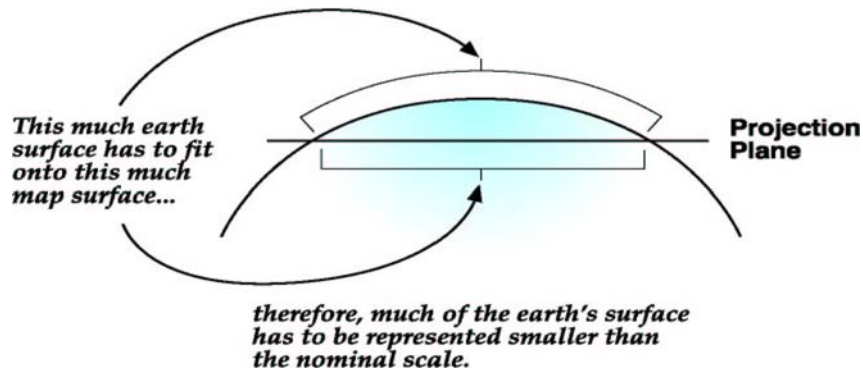
Success with GPS

Angie Schmidt, IDFG

- Geographic Coordinate Systems and Projections.
- Decimal Degrees and Degrees Minutes Seconds
- DNR Garmin for GPS waypoint management
- GPS tips
- Submitting coordinate information to IFWIS

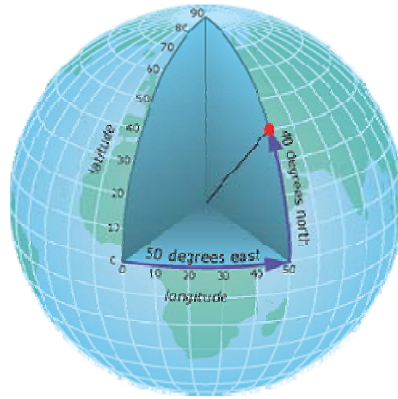


Squish!



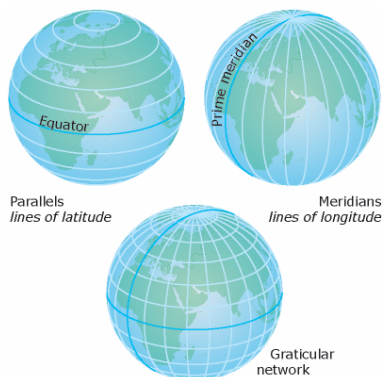
When you take a 3-d surface and flatten to 2-d, distortion occurs

Geographic Coordinate Systems



- Prime Meridian
- Angular unit of measure
- Datum

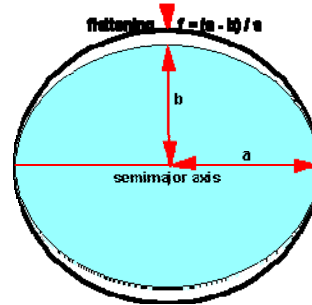
Units of Measure: Latitude/Longitude



- *Prime Meridian, Greenwich*
- Latitude lines are parallel to the equator
 - There are 180 lines of latitude. 90 above the equator and 90 below.
- Longitude lines converge at the poles
 - There are 360 lines of longitude. 180 west of the prime meridian and 180 east.

Datum: The Earth is NOT ROUND!

- Datums take into account the shape of the earth and provide a frame of reference for measuring on the earth surface.
- Here are a few – Nad27
Nad83, WGS84



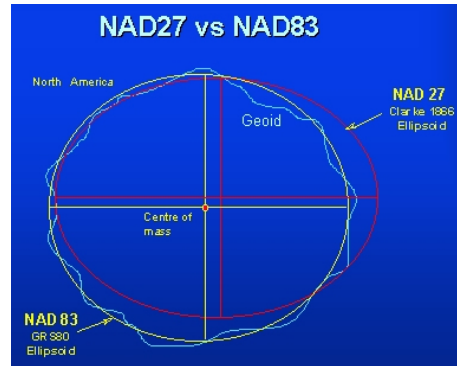
The earth is an ellipsoid...There are many calculations to describe the earth's shape.
e.g. Clarke 1866, GRS 1980

Datum: NAD 1927



- Origin of datum is Meades Ranch Kansas
- Based on ground measurements and spheroid Clarke 1866.
- Error increases as you move away from the "Ranch"

Datum: NAD 1983



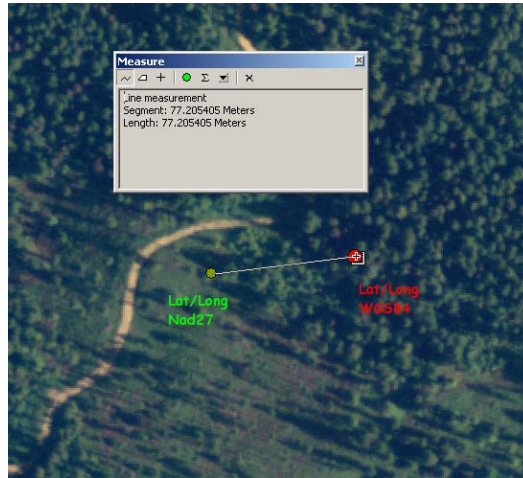
- Based on both ground and satellite measurements, GRS80
- Coordinate origin is the earth's center of mass
- Much more accurate than Nad1927

WGS 84

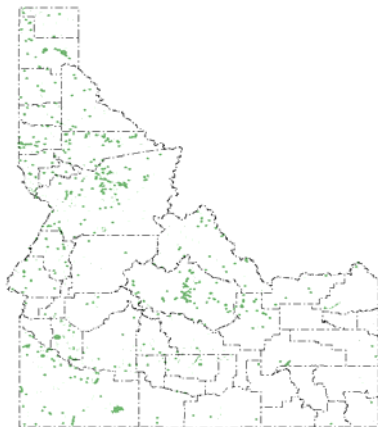


- Utilized by GPS.
- Coordinate origin is Earth's center of mass
- Not significantly different than NAD83 for the data we capture.

Datums are important!

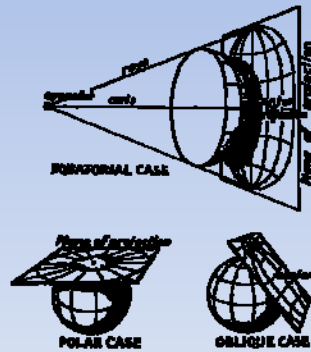


Dilemma!



- Longitude lines converge towards North Idaho
- Latitude lines are parallel, but have differing circumferences.
- Idaho looks squished when displayed on paper!
- Lat/Long is not projected information.
- A **projection** is needed!

Distortion

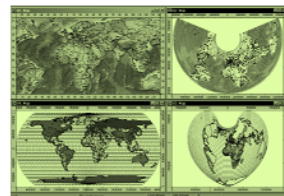


- All map projections distort:
 - Shapes of features
 - Distance
 - Area
 - Direction
- Projections focus on minimizing one or more distortions.

Projection Types...many

- Conformal – preserve angles.
 - Mercator. Idaho Transverse Mercator, or Universal Transverse Mercator (UTM).
- Equal-area - preserve area.
 - Albers.
- The list goes on and on... snore... yawn...

It is important to let others know how your data is projected (UTM Zone 11, NAD83)



Lat/Long – Dec. Degrees

Lat/Long can be displayed in different ways

- Degrees, Minutes, Seconds

-115°, 52', 25", 45°, 11', 34"

Degrees + Minutes/60 + Seconds/3600 = Decimal Degrees

-115 + 52/60 + 25/3600, 45 + 11/60 + 34/3600

- Decimal Degrees

-115.873611, 45.192778

- Degrees Decimal Minutes

-115° 52.4166', 45° 11.5666'

DMS to DD converters

<http://www.fcc.gov/mb/audio/bickel/DDMMSS-decimal.html>

The screenshot shows a web browser window displaying the FCC website's "Degrees, Minutes, Seconds and Decimal Degrees Latitude/Longitude Conversions" tool. The page title is "Degrees, Minutes, Seconds and Decimal Degrees Latitude/Longitude Conversions". The tool allows users to convert DMS coordinates to decimal degrees. The input fields are: "Enter Degrees Minutes Seconds latitude:" with values 45, 25, and 12; and "Enter Degrees Minutes Seconds longitude:" with values -115, 25, and 58. The "Convert to Decimal" button is highlighted. The results are: "Results: Latitude: 45.42" and "Longitude: 115.432778". The page also includes a search bar, a navigation menu, and a footer with contact information for the Audio Division.

Degrees Minutes Seconds to Decimal Degrees

Enter Degrees Minutes Seconds latitude: 45 25 12

Enter Degrees Minutes Seconds longitude: -115 25 58

Results: Latitude: 45.42 Longitude: 115.432778

Accuracy – how many decimals?

1 degree of latitude	=	1.000000 degree	or	110,874.40 meters
1/10 of a degree of latitude	=	0.100000 degree	or	11,087.44 meters
1/100 of a degree of latitude	=	0.010000 degree	or	1,108.74 meters
1/1000 of a degree of latitude	=	0.001000 degree	or	110.87 meters
1/10000 of a degree of latitude	=	0.000100 degree	or	11.09 meters
1/100000 of a degree of latitude	=	0.000010 degree	or	1.11 meters
1/1000000 of a degree of latitude	=	0.000001 degree	or	.11 meters

1 degree of longitude	=	1.000000 degree	or	95,506 meters
1/10 of a degree of longitude	=	0.100000 degree	or	9,550.6 meters
1/100 of a degree of longitude	=	0.010000 degree	or	955.06 meters
1/1000 of a degree of longitude	=	0.001000 degree	or	95.506 meters
1/10000 of a degree of longitude	=	0.000100 degree	or	9.551 meters
1/100000 of a degree of longitude	=	0.000010 degree	or	.955 meters
1/1000000 of a degree of longitude	=	0.000001 degree	or	.096 meters

These numbers are relevant for Texas. Idaho's will differ since we are further from the equator – aim for a minimum of 4 decimals.



DNR Garmin



- Application for managing GPS data
- Free from Minnesota DNR
- “Google” DNR GARMIN



DNR Garmin

Decimal
Degrees
WGS84

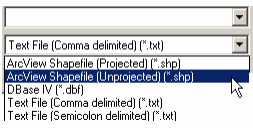
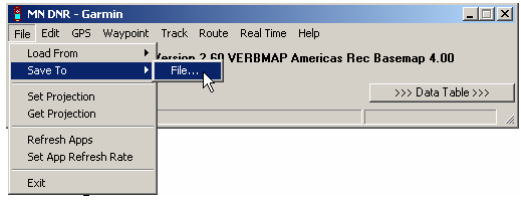
Projected
Coordinates

ID	Name	Lat	Long	x_proj	y_proj	comment	display	symbol	size	pos_value	color	altitude	depth	eqpt_class	sub_class	shp
14	WAYPOINT	47.0279952	-114.8727999	5206.033	396.32071	52440.95151122	0	8204	0	0	0	2800	0	0	0	120
15	WAYPOINT	47.0279952	-114.8727999	5206.033	396.32071	52440.95151122	0	8204	0	0	0	2800	0	0	0	120
16	WAYPOINT	47.0279952	-114.8727999	5206.033	396.32071	52440.95151122	0	8204	0	0	0	2800	0	0	0	120
17	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
18	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
19	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
20	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
21	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
22	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
23	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
24	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
25	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
26	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
27	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
28	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
29	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120
30	WAYPOINT	46.9973556	-114.4761888	526422.2440646	515687.9711294		0	8204	0	0	0	21	0	0	0	120

- Can upload or download to your GPS
- Contains Lat/Long and projected fields
- Option to save as a shapefile
- Don't need GIS software to run



DNR Garmin



- Save to a variety of formats
- ArcView Shapefile, unprojected works best
(Remember a shapefile consists of more than one file)
 - .shp, .dbf, .shx, .prj, .shp.xml
 - Don't edit the .dbf



Tips for Capturing GPS Locations with a Garmin

- Face South
- Place the GPS at the location for a minute or more
- Move out of the way, get a clear view of the sky
- Don't rely on the altimeter



Coordinate Submission to IFWIS

- Send Decimal Degrees, WGS84
 - Accuracy! The more the coordinates are converted the more error is induced.
- If a shapefile is sent make sure it has a projection file (.prj) and metadata (.xml)
- Source information is best. If you captured a point, send a point. If a polygon better describes the plant, send a polygon.



Review



- Geographic, Decimal Degrees - These coordinates are not projected.
- Decimal degrees- a decimal format of Lat/Long, more decimals for accuracy.
- Projection - manages distortion.
- Datum - describes the shape of the earth. Is needed when providing any coordinate information.
- DNR Garmin - Helpful for managing GPS data.
- Send IFWIS source data - Geographic WGS84



Contact Information

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