

Appendix C: Table of remote sensing platforms and sensors for seagrass and water quality data by Don Field, NOAA Beaufort.

Selected Remote Sensing Platforms (Modified from Jensen, 2000)

(Compiled in Sept. 2002 – Prices subject to change)

A. Satellites

| Band | Bandwidth (nm) | Resolution (m) | Off Nadir Viewing | Swath (km) | Temporal Resolution (days) | Cost (\$) |
|-----------------------------------|-----------------------|-----------------------|--------------------------|-------------------|-----------------------------------|------------------|
| Advanced Land Imager (ALI) | | | | | | |
| Pan | 0.480-0.690 | 10 x 10 | No | 185 | Unknown – Probably 16 | \$2000* |
| 1 | 0.433-0.453 | 30 x 30 | | | | |
| 2 | 0.450-0.515 | 30 x 30 | | | | |
| 3 | 0.525-0.605 | 30 x 30 | | | | |
| 4 | 0.630-0.690 | 30 x 30 | | | | |
| 5 | 0.775-0.805 | 30 x 30 | | | | |
| 6 | 0.845-0.890 | 30 x 30 | | | | |
| 7 | 1.200-1.300 | 30 x 30 | | | | |
| 8 | 1.550-1.750 | 30 x 30 | | | | |
| 9 | 2.080-2.350 | 30 x 30 | | | | |

* \$2000 covers the cost of a ALI image and a Hyperion image. Both of these sensors are on the NASA Earth Observing – 1 satellite. This is an experimental platform, the charge is considered cost recovery for tasking the satellite. Due to the experimental nature of the satellite, tasking may be difficult. Also, it is presently operating on an extended schedule, longer than originally planned, it is not certain how much longer the satellite will be operational.

Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)

| | | | | | | |
|----------|------------|--------------------|-----|----|------------------|------|
| 14 bands | 0.52-11.65 | 15 x 15 to 90 x 90 | Yes | 60 | “on demand only” | \$60 |
|----------|------------|--------------------|-----|----|------------------|------|

HYPERION

| | | | | | | |
|-----|-----------|---------|---|-----|---------|---------|
| 220 | 0.40-2.50 | 30 x 30 | ? | 7.5 | Unknown | \$2000* |
|-----|-----------|---------|---|-----|---------|---------|

* See ALI above

| Band | Bandwidth (nm) | Resolution (m) | Off Nadir Viewing | Swath (km) | Temporal Resolution (days) | Cost (\$) |
|---------------|-----------------------|-----------------------|--------------------------|-------------------|-----------------------------------|------------------|
| IKONOS | | | | | | |
| Panchromatic | 0.45-0.90 | 1 x 1 | Yes | 11 | < 3 | \$1500-4500* |
| 1 | 0.45-0.52 | 4 x 4 | | | | |
| 2 | 0.52-0.60 | 4 x 4 | | | | |
| 3 | 0.63-0.69 | 4 x 4 | | | | |
| 4 | 0.76-0.90 | 4 x 4 | | | | |

*As cheap as \$1500 for archived imagery – to task the satellite costs \$4500 and up.

Indian Remote Sensing Satellites (IRS) IRS-1C and 1D

| | | | | | | |
|-------|-----------|-----------|-----|-----|---------------|----------|
| 1 | | | | | | \$Unkown |
| 2 | 0.52-0.59 | 23 x 23 | No | 142 | 24 | |
| 3 | 0.62-0.68 | 23 x 23 | No | 142 | 24 | |
| 4 | 0.77-0.86 | 23 x 23 | No | 142 | 24 | |
| 5 | 1.55-1.70 | 70 x 70 | No | 148 | 24 | |
| Pan | 0.50-0.75 | 5.5 x 5.8 | Yes | 70 | Off Nadir – 5 | |
| Wifs* | 0.62-0.68 | 188 x 188 | No | 774 | 5 | |
| Wifs | 0.77-0.86 | 188 x 188 | No | 774 | 5 | |

* Wide Field Sensor

Landsat Thematic Mapper on Landsat 5

| | | | | | | |
|---|-----------|-----------|----|-----|----|-------|
| 1 | 0.45-0.52 | 30 x 30 | No | 185 | 16 | \$425 |
| 2 | 0.52-0.60 | 30 x 30 | | | | |
| 3 | 0.63-0.69 | 30 x 30 | | | | |
| 4 | 0.76-0.90 | 30 x 30 | | | | |
| 5 | 1.55-1.75 | 30 x 30 | | | | |
| 6 | 10.4-12.5 | 120 x 120 | | | | |
| 7 | 2.08-2.35 | 30 x 30 | | | | |

| Band | Bandwidth (nm) | Resolution (m) | Off Nadir Viewing | Swath (km) | Temporal Resolution (days) | Cost (\$) |
|--|-----------------------|-----------------------|--------------------------|-------------------|-----------------------------------|------------------|
| Landsat Enhanced Thematic Mapper Plus (ETM⁺) | | | | | | |
| 1 | 0.450-0.515 | 30x30 | No | 185 | 16 | \$425 |
| 2 | 0.525-0.605 | 30x30 | | | | |
| 3 | 0.630-0.690 | 30x30 | | | | |
| 4 | 0.750-0.900 | 30x30 | | | | |
| 5 | 1.55-1.75 | 30x30 | | | | |
| 6 | 10.40-12.50 | 60x60 | | | | |
| 7 | 2.08-2.35 | 30x30 | | | | |
| 8 (pan) | 0.52-0.90 | 15x15 | | | | |

Moderate Resolution Imaging Spectrometer (MODIS)

| | | | | | | |
|----------|--------------|--------------------------------------|----|------|---|-----------|
| 36 bands | 0.620-14.385 | Variable 250 x 250 to 1000 x 1000 | No | 2330 | 2 | \$50-100* |
|----------|--------------|--------------------------------------|----|------|---|-----------|

* Handling costs

NOAA Advanced Very High Resolution Radiometer (AVHRR) (Local Area Coverage Data)

| | | | | | | |
|---|------------|-------------|----|------|-------|-----------|
| 1 | 0.58-0.68 | 1100 x 1100 | No | 2700 | Daily | \$50-190* |
| 2 | 0.725-1.10 | 1100 x 1100 | | | | |
| 3 | 3.55-3.93 | 1100 x 1100 | | | | |
| 4 | 10.3-11.3 | 1100 x 1100 | | | | |
| 5 | 11.5-12.5 | 1100 x 1100 | | | | |

* Can be obtained free if you are a registered research user.

| Band | Bandwidth (nm) | Resolution (m) | Off Nadir Viewing | Swath (km) | Temporal Resolution (days) | Cost (\$) |
|--|-----------------------|-----------------------|--------------------------|-------------------|-----------------------------------|------------------|
| Sea-Viewing Wide-Field-of-View Sensor (SeaWiFS) | | | | | | |
| 1 | 0.402-0.422 | 1130 x 1130 | No | 2800 | Daily | No Cost* |
| 2 | 0.433-0.453 | 1130 x 1130 | | | | |
| 3 | 0.480-0.500 | 1130 x 1130 | | | | |
| 4 | 0.500-0.520 | 1130 x 1130 | | | | |
| 5 | 0.545-0.565 | 1130 x 1130 | | | | |
| 6 | 0.660-0.680 | 1130 x 1130 | | | | |
| 7 | 0.745-0.785 | 1130 x 1130 | | | | |
| 8 | 0.845-0.885 | 1130 x 1130 | | | | |

* No Cost if you are an authorized research user, a status that is easily obtained by government and academic researchers.

SPOT 4 High Resolution Visible Sensor Systems

| | | | | | | |
|---------------------|-----------|---------|-----|----|-----------------------------|--------|
| 1 | 0.50-0.59 | 20 x 20 | Yes | 60 | Nadir – 26 Off Nadir 1-5 | \$2500 |
| 2 | 0.61-0.69 | 20 x 20 | | | | |
| Panchromatic | 0.61-0.69 | 10 x 10 | | | | |
| 3 | 0.79-0.89 | 20 x 20 | | | | |
| Short Wave Infrared | 1.58-1.75 | 20 x 20 | | | | |

SPOT 5 High Resolution Visible Sensor Systems

| | | | | | | |
|---------------------|-----------|----------|-----|----|-----------------------------|--------|
| Panchromatic | 0.48-0.71 | 2.5 or 5 | Yes | 60 | Nadir – 26 Off Nadir 1-5 | \$2500 |
| 1 | 0.50-0.59 | 10 x 10 | | | | |
| 2 | 0.61-0.69 | 10 x 10 | | | | |
| 3 | 0.79-0.89 | 10 x 10 | | | | |
| Short Wave Infrared | 1.58-1.75 | 20 x 20 | | | | |

| Band | Bandwidth (nm) | Resolution (m) | Off Nadir Viewing | Swath (km) | Temporal Resolution (days) | Cost (\$) |
|------------------|-----------------------|-----------------------|--------------------------|-------------------|-----------------------------------|------------------|
| QuickBird | | | | | | |
| Panchromatic | 0.45-0.90 | 0.61 x 0.61 | Yes | 16.5 at Nadir | < 3 | \$2000 and up* |
| 1 | 0.45-0.52 | 2.44 x 2.44 | | | | |
| 2 | 0.52-0.60 | 2.44 x 2.44 | | | | |
| 3 | 0.63-0.69 | 2.44 x 2.44 | | | | |
| 4 | 0.76-0.90 | 2.44 x 2.44 | | | | |

* As low as \$600 for archived images

B. Sensors on Sub-Orbital Platforms (Costs represent minimums – ultimate cost is determined by study area size)

Airborne Visible Infrared Imaging Spectrometer (AVIRIS)

224 bands 0.40-2.50 Varies with altitude No Varies with altitude On Demand \$10000 and up

Compact Airborne Spectrographic Imager-2 (CASI-2)

288 User Specified Bands Varies with altitude No Varies with altitude On Demand \$10000 and up

Daedalus Airborne Multispectral Scanner (AMS)

| | | | | | | |
|----|-------------|----------------------|----|----------------------|-----------|----------------|
| 1 | 0.420-0.450 | Varies with altitude | No | Varies with altitude | On Demand | \$10000 and up |
| 2 | 0.450-0.520 | | | | | |
| 3 | 0.520-0.600 | | | | | |
| 4 | 0.600-0.630 | | | | | |
| 5 | 0.630-0.690 | | | | | |
| 6 | 0.690-0.750 | | | | | |
| 7 | 0.760-0.900 | | | | | |
| 8 | 0.910-1.050 | | | | | |
| 9 | 3.000-5.500 | | | | | |
| 10 | 8.500-12.50 | | | | | |

| Band | Bandwidth (nm) | Resolution (m) | Off Nadir Viewing | Swath (km) | Temporal Resolution (days) | Cost (\$) |
|--|-----------------------|-----------------------|--------------------------|----------------------|-----------------------------------|------------------|
| GeoVantage | | | | | | |
| 4 User Specified Bands | | Down to 0.25m | No | Varies with altitude | On Demand | \$2000 and up |
| NASA Airborne Terrestrial Applications Sensor (ATLAS) | | | | | | |
| 1 | 0.450-0.520 | Varies with altitude | No | Varies with Altitude | On Demand | \$10000 and up |
| 2 | 0.520-0.600 | | | | | |
| 3 | 0.600-0.630 | | | | | |
| 4 | 0.630-0.690 | | | | | |
| 5 | 0.690-0.760 | | | | | |
| 6 | 0.760-0.900 | | | | | |
| 7 | 1.550-1.750 | | | | | |
| 8 | 2.080-2.350 | | | | | |
| 9 | removed | | | | | |
| 10 | 8.200-8.600 | | | | | |
| 11 | 8.600-9.000 | | | | | |
| 12 | 9.000-9.400 | | | | | |
| 13 | 9.600-10.20 | | | | | |
| 14 | 10.20-11.20 | | | | | |
| 15 | 11.20-12.20 | | | | | |

Jensen, J. R. 2000. Remote sensing of the environment, an earth resource perspective, Prentice Hall, Upper Saddle River, NJ, 544 p.